M/023/003

BRUSHWELLMAN
ENGINEERED MATERIALS

Brush Wellman Inc.
P.O. Box 815
Delta, Utah 84624
Phone 801/864-2701

October 28, 1993

Mr. Don Ostler, Director
Department of Environmental Quality
Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake city, Utah 84114-4870

RE: Tailings Pond Conceptual Closure Plan, Ground Water Discharge Permit No. UGW270001

Dear Mr. Ostler:

Part I.G.2., as amended, of the January 15, 1993 Ground Water Discharge Permit No. UGW270001 for the Brush Wellman tailings pond requires that a conceptual closure plan for the tailings pond be submitted by November 1, 1993. This letter communicates our current concepts for the eventual closure of the tailings pond at our Delta mill. The time frame for final closure activities is unknown at this point but we are assuming this date would be at least 25 years in the future. Thus this closure plan is purposely very conceptual in nature.

Removal of Equipment and Facilities

During the final decommissioning of the milling facilities, we would demolish and remove from the surface any buildings, structures or other facilities. The salvageable materials and equipment would be sold and removed from the property. Non-salvageable materials and debris would be disposed of on site or in off-site landfills according to State solid waste regulations. According to Brush Wellman policy, any beryllium-contaminated materials and debris would be buried in the tailings pond.

Any piping, pumps, poles, facilities and other materials used in the operation of the tailings facility, and that would be present at the end of operations would either be decontaminated of beryllium and sold or buried in the tailings pond.

Drying and Dewatering

At the end of operations, the tailings pond will contain the final amount of tailings solution. This will be evaporated with the forced evaporation system which is part of the present tailings operations.

The water remaining in the tailings solids would gradually evaporate through the final desiccation process of the tailings surface and also would seep out the base of the tailings pond. As described in the April 15, 1993 Best Available Technology Report for the tailings pond submitted by Brush to the DWQ, the tailings pond is expected to have a long-term seepage rate of up to 250 acre-feet per year through the slime sealing layer proposed to be deposited during 1994 through 1999. Tailings deposited above this layer would be expected to drain through the slime liner at this rate. Tailings under this slime liner have been known to drain into the underlying soil at a rate of up to 704 acre-feet per year. Thus at the end of operations, the tailings solids under the slime liner would be expected to be essentially drained and the tailings above the slime liner would be expected to be saturated.

Assuming a facility life of at least 25 years following deposition of the slime liner, and a saturated pore volume of this material of about 66 acre-feet per year, there would be approximately 1,650 acre-feet of water in the tailings above the slime liner at closure that would seep out at a rate of about 250 acre-feet per year. At this rate, it would take approximately 6.6 years for the tailings to become fully drained through downward seepage only. However, because of evaporation to the surface, the actual time period for the tailings to become fully drained is probably more in the range of 3 to 6 years. All tailings solution drained out the bottom of the tailings pond would be contributed to the seepage mound that already is known to exist under the facility.

The tailings solids are not toxic and do not contain sulfide minerals which could result in long-term, chemical reactions. The tailings liquid is a high TDS, low pH aqueous solution which is not toxic and is readily neutralized by the underlying foundation soils. It is expected that, once the initial tailings water drains from the tailings, the remaining solids will not produce leachate that is harmful. In fact any long-term leaching of the tailings from precipitation is expected to produce seepage that is much lower in TDS and much higher in pH than the initial tailings water.

Groundwater Protection

As discussed in previous correspondence with the DWQ, we estimate that approximately 4,000 acre-feet of water can reasonably be removed from the current seepage mound. The remaining water would present minimal head on top of the clay aquitard and should not be a source of groundwater contamination. As part of the approved Best Available Technology, Brush will pump the seepage mound at a rate that should at least maintain its current volume and very likely reduce this volume by 4,000 acre-feet in approximately 14 years. Thus, it is assumed that further pumping of the seepage mound at

the time of closure would not be required. If, at the time of closure, the 4,000 acre-foot reduction in the mound had not yet occurred, this volume would be removed from the mound as part of the closure procedure and the water removed from the mound would be evaporated in the tailings pond prior to final stabilization of the tailings surface.

Monitoring wells currently in place would be monitored for a reasonable period of time following closure activities to determine that there are no impacts to groundwater which would required corrective action. The time period for this post-closure groundwater monitoring is currently estimated to be 3 years.

Surface Stabilization

The tailings solids as deposited range in grain size from medium sand through clay sized particles. The sand and silt fraction forms loose surfaces which are friable, adsorb water readily and tend to be moved by wind. The clay and silty clay fraction a forms hard surface crust which adsorbs water slowly and is not moved by the wind.

The objective of the surface stabilization of the tailings would be to cover the tailings surface with enough perennial vegetation to protect the tailings surface from wind erosion. Sealing the surface of the tailings to prevent infiltration of precipitation would not be necessary.

The dried surface of the tailings would either be revegetated directly or covered with soil borrowed from the Brush property adjacent to the tailings pond. The area of tailings solids to be treated in this manner would be approximately 200 acres.

The potential for direct revegetation of the tailings has not yet been tested. As initially deposited, the pH of the tailings solids, because of the contained tailings water, is approximately 2.0 and the salinity is high. After drainage of this initial tailings water, and leaching of the tailings surface by precipitation, the pH and salinity of the tailings solids near the surface would be expected to become more amenable to direct revegetation. This would be done with a seed drill and soil amendments such as mulch and fertilizer would also be used as required. Prior to abandonment of the tailings pond, the feasibility of direct revegetation would be researched on site with test plots developed in dried tailings.

If direct revegetation of the tailings solids is shown to be impractible, a 6- to 12-inch cover of native soil would be spread over the tailings surface and then revegetated.

The outer slope of the tailings dike would be left at the as-built 2h:1v configuration and the inner slope would be left at the as-built 1.5:1 configuration. The top of the dike would be scarified to relieve compaction. All of these surfaces would then be seeded with a hydroseeder. The appropriate soil amendments, including mulch and fertilizer would also be added to the surfaces.

The success of the revegetation efforts would be monitored for a period of 3 years. If problems with the revegetation are detected during this period, additional reseeding will be conducted as required.

If you have any questions on this material, please contact Dan Perry at 864-2701 or Brian Buck at 943-4144.

Sincerely,

Don McMillan
Director, Utah Operations

cc: Dan Perry, Brush Wellman
Rick Broschat, Brush Wellman
Brian Buck, JBR Consultants